agents through which the disease is transmitted to man. Kolle and Nuttall, however, obtained negative results in this direction. The Indian Plague Commission (1899) came to the conclusion that Simond's proposition that suctorial insects play an important part in the transmission of plague from sick to healthy animals is so weak as to be hardly deserving of consideration.

In 1902 Gauthier and Raybaud, at Marseilles, carried out further experiments, and got positive results. "Recueillant en bloc un certain nombre de puces sur des rats capturés sains, nous avons parasité artificiellement à leur asile des animaux de laboratoire préalablement inoculés de cultures pures. Nous avons cherché ensuite à produire infestation parasitaire et l'infection consécutive d'animaux neufs. Les résultats absolument concordants de cette série d'experiences (five experiments) nous permettent de conclure que les puces des rats sont capables d'une façon constante de transmettre la peste d'animal à animal rat ou souris."

Further, they showed that rat fleas could bite man.

Ashburton Thompson, studying the plague epidemics in Sydney from the epidemiological standpoint, came to the conclusion that Simond's hypothesis of the flea best explains the phenomena of the epidemic plague as seen at Sydney. He further states that the laboratory proof has been given by Raybaud and Gauthier, and by Dr. J. S. C. Elkington at Bombay, "whose observations are affirmatory of Simond's original experiments made in India."

Elkington[1] describes his own results in the following words:—"The technical difficulties were considerable . . . and a great deal of experiment was required before a satisfactory means was obtained of insuring the captivity of such a small and active insect whilst feeding. This was finally effected by confining them in a test tube of which the mouth was covered with very fine gauze through which the insect could thrust its proboscis when the gauze was applied to the skin of the feeder-animal. Fleas were then fed on experimentally infected rats. . . . The fleas were then kept in a dark drawer still in the feeding tube for varying periods, after which they were again fed on healthy young rats selected for their vigour and health. The results were most successful, and I have records of four instances in which I was able to carry out this method of infection. Captain Liston also was successful in several cases. Attempts were then made to convey the disease from human beings to rats. Two instances were successful, the period from the first feeding being eight hours. . . . Both rats died of plague, one on the fourth, the other on the sixth day."

Much attention was now given to the question as to what species of fleas those found on rats belong.

Tidswell, in 1903, working at Sydney, found that 81 per cent. of the fleas on rats were *P. pallidus* (*i.e. P. cheopis*). Tiraboschi found that 40 per cent. of fleas on ship rats belonged to the same species. Liston, 1905, found that while other species were found on European rats in India, 99 per cent. of the fleas were *P. cheopis*. Though unable himself to get positive results in the transmission, yet he says, "To sum up, then, rat fleas (*P. cheopis*) can always be found in (plague) infected houses; these fleas will take to an animal which is not their normal host." Finally we have the experiments of the Plague Commission of 1905 working in Bombay. These elaborate and very carefully conducted experiments have conclusively established the fact of the conveyance of plague from the infected to the healthy rat by means of the plague flea. We still require light on the exact method by which the bacilli are conveyed; why so many other investigators have failed in similar experiments, and whether rats transmit the disease in any other way, and, indeed, whether this is the most important way. In discoveries of this kind we are apt to give the credit at the time to the person who forges the last link of the chain which stretches across the gap of unknown causes. Credit is, however, also due to those who forge the intermediate links; indeed, perhaps most of all to him who forged the first link, without which the chain would not have been begun.

J. W. W. S.

Literature.

Consult especially:—

Abel: *Zeit. f. Hygiene,* Heft. xxxvi., 1901.

Tiraboschi: *Zeit. f. Hygiene,* Heft. xlviii., 1904.

Journal of Hygiene, vol. vi., No. 4, September, 1906.

Loir: "Histoire des Epidemie de Peste à Tunis." *Rev. Scientif.,* 1900, No. 13, p. 395.

Allbutt and Rolleston: "System of Medicine," vol. ii., part ii., p. 375, Art. "Plague."

Gauthier et Raybaud: *Revue d'Hygiène,* 1903.

Ashburton Thompson: Report on the Outbreak of Plague at Sydney, dated July, 1903.

J. S. C. Elkington: *Australasian Medical Gazette,* xxii., p. 348.

THE INTERNATIONAL ASSOCIATION OF SEISMOLOGY.

THE first general meeting of the International Association of Seismology was held at The Hague on September 24 and 25, and was preceded on September 21 and 23 by a meeting of the permanent committee, which is the body charged with carrying out the decisions of the general assembly.

The following countries (in alphabetical order according to their French names) now form part of the association:—Germany, Austria, Belgium, Bulgaria, Canada, Chili, Congo, Spain, United States, Great Britain, Greece, Hungary, Japan, Italy, Mexico, Norway, the Colonies of the Netherlands, Portugal, Roumania, Russia, Servia, and Switzerland. It was understood that the French Government was prepared to join, but as the necessary money grant had not been submitted to the Chamber of Deputies, the adhesion has not yet been formally made. Nevertheless, the French delegates were requested to take part in the proceedings on the same footing as those of the other countries.

The budget for the forthcoming year was submitted to the permanent committee, and was carefully discussed. The income of the association is now about 1900*l.* The secretary, Prof. Kövesligethy, of Budapest, on whom a great part of the labour of the association falls, receives 200*l.*; 460*l.* is spent in other salaries, including those of a type-writer, mechanic, and in connection with the Central Bureau at Strassburg; office expenses amount to about 150*l.*

In addition to the above salaries, two scientific assistants, Mr. Rosenthal, of Pulkowa, and Mr. Oddone, of Rome, were during last year paid out of the funds of the association, and were engaged in preparing separate catalogues of microseismic and macroseismic disturbances. The question how far scientific assistants of this kind should during the next two years be maintained by the association was left to the decision of the executive committee, which

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[1] Board of Public Health. Address on Fleas and Plague Convection by Dr. J. S. C. Elkington, delivered before the Victorian Branch of the British Medical Association, July 22, 1903.

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consists of the president, vice-president, and secretary. There is no question, however, that the formation of the catalogues will always form one of the great objects of the association, and its publication will absorb a material fraction of its funds.

One of the subjects discussed at the meetings was the study and origin of small periodic disturbances, some of which have short periods of 6 to 11 seconds, or the somewhat longer period of 30 seconds. The latter seem to occur when strong winds sweep over a country, but no connection of the former with meteorological occurrences has been proved, and the only suggestion of a rational explanation is that due to Prof. Wiechert, who believes them to be due to the impact of ocean waves on the shores. A small committee was appointed to investigate the question, and a sum of 50*l.* was placed at its disposal. Prof. Omori, who had independently expressed the wish to investigate this matter, was also granted a sum of 50*l.* to carry out his investigations.

Another committee was appointed to report on the question of preparing a complete annual index of the literature of the subject. The committee was instructed to enter into communication with the International Catalogue and the "Office international de Bibliographie," in order to ascertain whether one of the existing organisations may be utilised for the purpose.

According to a resolution arrived at in Rome in October, 1906, the president of the association vacates his office on April 1 following the general meetings, which, as a rule, take place every four years. The permanent committee had therefore to elect a new president; Prof. Palazzo, who has held the office during the last year, not being re-eligible, a ballot was taken, and Prof. Arthur Schuster received the majority of votes. In thanking the meeting for the honour bestowed upon him, and accepting the office, Prof. Schuster said that he was not an expert on seismological questions, but considered it to be his duty to accept the position, as he considered that it was intended as a recognition of the services rendered by Great Britain, and notably by Prof. Milne, not only in originating the scientific study of earthquakes, but also in first organising combined observations on an international basis. Prof. Forel, of Lausanne, who is well known through his work on seiches, was elected vice-president.

The general meeting was opened on the morning of September 24 by a speech of the Minister of the Colonies, and the two succeeding days were taken up in great part by addresses on various subjects connected with seismology. Of special interest were the account given by Prince Galitzin of his seismometric studies, and a paper by Prof. Wiechert on the utilisation of seismic records towards the investigation of the physical properties of the earth.

It was the duty of the general meeting to fix the locality of the central bureau, and it was resolved to retain Strassburg for the next period of four years.

The delegates were most hospitably entertained; an evening entertainment, as well as a dinner, was given by the Minister of the Colonies on behalf of the Government of Her Majesty the Queen, and the meeting concluded with an excursion by boat through some of the characteristic canals and inland lakes of the country. Prof. van der Stok, the vice-president, and his able assistants, Dr. Hartmann, Dr. Romeijn, Mr. Levoir, and Baron van Voorst tot Voorst, must be congratulated on the perfection of the organisation, which more than anything else allowed the meeting to do its work smoothly and effectively. The permanent committee will come together in 1909 at some place in Switzerland not yet determined, and the place for the next general meeting in 1911 will then have to be fixed. It was too soon to come to any definite decision, but an informal expression that the meeting might appropriately take place in England seemed to meet with a very general approval.

SIR F. L. McCLINTOCK, K.C.B., F.R.S.

ADMIRAL SIR FRANCIS LEOPOLD McCLINTOCK, whose death on Sunday last, at eighty-eight years of age, we regret to announce, will be remembered so long as the story of polar exploration has any interest for the human race. Fifty years have passed since the *Fox*, with Sir Leopold (then Captain) McClintock in command, sailed in search of the Franklin expedition, and the fiftieth anniversary of this memorable event was appropriately marked on June 30 last by a letter of congratulation sent to him from the Royal Geographical Society.

Sir Leopold McClintock's Arctic service began in 1848, when he accompanied Sir James Clark Ross as second lieutenant on board H.M.S. *Enterprise*, in the expedition sent out by the Admiralty. Returning unsuccessful in November, 1849, McClintock joined a second expedition sent out early in 1850 as senior lieutenant of H.M.S. *Assistance*, with Sir Erasmus Ommanney. It was his fortune in August, 1850, to see, at Cape Riley, the first traces of the missing Franklin expedition. In the following spring, whilst frozen up at Griffith Island, he signalised himself by a remarkable sledge journey of 80 days and 760 geographical miles, reaching the most westerly point which had been attained from the east in the Arctic regions. Upon the return of this expedition to England in October, 1851, he was promoted to the rank of commander; and in the following spring he proceeded to the Arctic regions in command of H.M.S. *Intrepid*, one of five vessels composing the third searching expedition, under Sir Edward Belcher's command. In accordance with instructions from the Admiralty, the *Intrepid*, in company with the *Resolute*, Captain Kellett, wintered at Melville Island, in order to search for Captain McClure and his companions; and, fortunately, they were discovered and rescued, after their three years' imprisonment in the ice. McClintock again distinguished himself by his sledge journey of 105 days and 1210 geographical miles into the hitherto unexplored region northward of Melville Island. The advances which Arctic sledge-travelling has made are almost entirely due to the improvements effected by him. Abandoning four out of the five ships imbedded in the ice, and also McClure's ship, the *Investigator*, the *personnel* of this expedition, with McClure and his companions, returned to England in October, 1854, in the depôt ship *North Star*, and two relief ships, freshly arrived out, under Captain Inglefield.

In 1857 McClintock accepted the command of the search expedition fitted out mostly at Lady Franklin's expense. He selected and equipped the steam-yacht *Fox*, of 177 tons, and with twenty-four companions sailed on July 1, 1857. He returned on September 20, 1859, having discovered, upon the north-west shore of King William's Island, a record announcing the death of Sir John Franklin and the abandonment of the *Erebus* and *Terror*. He brought home intelligence of their discoveries and the fate of their crews, and many relics of the expedition. The story of this voyage was fully related by McClintock himself in "The Voyage of the *Fox* in the Arctic Seas: a Narrative of the Discovery of the Fate of Sir John Franklin and his Companions," a work which ran through

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